

Dentaliid Taxa Referred to the Siphonodentaliidae

(Mollusca : Scaphopoda)

with a Description of a New Species

BY

JOHN N. KRAEUTER

University of Georgia Marine Institute, Sapelo Island, Georgia 31327

(3 Text figures)

INTRODUCTION

WHILE EXAMINING RADULAE of the Western North Atlantic Dentaliidae for a comprehensive systematic revision, it became apparent that the subgenus *Compressidens* Pilsbry & Sharp (1897) belonged within the Siphonodentaliidae. This familial arrangement was first suggested by WATSON (1879) and most recently by EMERSON (1962), but the subgenus had been retained in the Dentaliidae pending knowledge of the radular characters of the group.

The type of *Compressidens* has been firmly established as *Dentalium pressum* Pilsbry & Sharp (1897: 123). This species was originally described as *D. compressum* WATSON (1879), but the name was preoccupied by *D. compressum* d'Orbigny (1850) and Watson's taxon was renamed by PILSBRY & SHARP (1897).

In the original description WATSON (1879) stated: "It is very possible that this [*Dentalium compressum*] may be a *Siphodentalium*, . . ." but by the time he had completed the *Challenger* Report, WATSON (1885) states: "In my Prelim. Report (loc. cit) I said that it was very possible that this might be a *Siphodentalium* . . . Mr. Dall (loc. cit) seems to have been able from his material to settle this point, for he speaks positively on the matter and says, 'it is not a *Siphodentalium*.'" DALL (1881: 38) had stated: "this turns out not to be a *Siphodentalium*, after all", but he gave no evidence for his decision.

When Pilsbry & Sharp renamed *Dentalium compressum* Watson (1879), they selected a new type, Academy of Natural Sciences at Philadelphia Cat. No. 72365, but Watson's type must be accepted as the holotype, thus relegat-

ing Pilsbry & Sharp's typological specimen to the status of a hypotype.

EMERSON (1962) suggested that *Compressidens* be placed within *Pulsellum*, and his suggestion is accepted pending radular studies of the Siphonodentaliidae. The following revised classification of *Pulsellum* is suggested, and the supraspecific diagnoses are modified after EMERSON (1962).

METHODS

The study is based on materials from the American Museum of Natural History (AMNH), United States National Museum (USNM), Academy of Natural Sciences at Philadelphia (ANSP), National Marine Fisheries, Woods Hole, Massachusetts (NMFS), and the Museum of Comparative Zoology (MCZ). I attempted to examine all materials in these collections. Radular and shell drawings were made with a camera lucida. All radular and shell measurements are in millimeters (mm) and centimeters (cm), respectively, and the following abbreviations are used: L - length; W - apertural width; A - arc; and T - apical width.

SYSTEMATIC ACCOUNT

Pulsellum Stoliczka, 1868

Pulsellum Stoliczka, 1868, Mem. Geol. Surv. India, Palaeontologica Indica 2 (5): 441. - COSSMANN, 1888, Ann. Soc. Roy. Malacol. Belg. 23: 15. - EMERSON, 1962, Journ. Paleontol. 36 (3): 475.

Siphonentalis G. O. Sars, 1878, Mollusca regionis Arcticae Norvegiae: Universitetsprogram for 1878: 104; Christiania.

¹ Based, in part, on a Ph. D. dissertation submitted to the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Philosophy. Contribution from University of Georgia Marine Institute, Sapelo Island, Georgia 31327.

Siphonodentalis, Clessin, 1896, Systemat. Conchyl. Cabinet, Nürnberg 6 (5): 30.

Type Species: By subsequent designation, COSSMANN (1888), *Pulsellum lofotense* (M. Sars, 1865).

Diagnosis: Shell size – small to medium, moderately to strongly curved; sculpture – lacking or rarely longitudinally ribbed; largest diameter at or immediately posterior to oral aperture. Aperture circular or dorsoventrally compressed. Apex simple.

Remarks: This siphonodentaliid genus has been amended to include the forms transferred from the Dentaliidae.

(*Compressidens*) Pilsbry & Sharp

Compressidens Pilsbry & Sharp, 1897, in TRYON, Man. Conch. 17: 123. – EMERSON, 1962, Journ. Paleont. 36 (3): 474.

Type Species: By original designation, *Dentalium pressum* Pilsbry & Sharp, 1897.

Diagnosis: Shell size – small, moderately curved; sculpture – smooth, or rarely longitudinally ribbed, or with weak transverse growth lines. Aperture dorsoventrally compressed producing an elliptical section. Apex simple. Radula – median tooth higher than wide. Median teeth do not extend to anterior end of ribbon.

Remarks: This subgenus is redefined to include all dorsoventrally compressed forms originally assigned to *Pulsellum s. l.* Further radular and soft part studies may prove this in error, and perhaps *Compressidens* will be raised to generic status.

(*Pulsellum*) *s. s.*

Diagnosis: Shell moderately to strongly curved, slightly tapering, largest diameter at the oral aperture, typically circular in section; . . . surface smooth, without sculpture other than growth lines; apex simple, without lobes or slits; foot of animal with a pedal disk as in *Siphonodentalium*, but pedal disk convex, not concave, and provided with a central filament.

Remarks: The diagnosis is quoted from EMERSON (1962), but has been amended by eliminating reference to dorsoventral compression.

Pulsellum (Compressidens) pressum (Pilsbry & Sharp)
(Figures 1a to 1f)

Dentalium compressum Watson, 1879, Journ. Linn. Soc. London 14: 516 (non *D. compressum* d'Orbigny, 1850). –

DALL, 1881, Bull. Mus. Comp. Zool. 9: 38. – WATSON, 1885, *Challenger* Rept. 42: 9; pl. 1, fig. 9. – DALL, 1889, Bull. Mus. Comp. Zool. 18: 426. – DALL, 1889, Bull. U. S. Nat. Mus. 37: 76 and reprint 1903.

Dentalium (Compressidens) pressum Pilsbry & Sharp, 1897, in TRYON, Man. Conch. 17: 124; pl. 7, fig. 11; pl. 22, figs. 50–52. – HENDERSON, 1920, Bull. U. S. Nat. Mus. 111: 83; pl. 14, figs. 3, 6, 8. – EMERSON, 1952, Smithsonian Misc. Coll. 117 (6): 7.

Original Description: SHELL. – Compressed between its concave and convex curves to the extent of 0.016 in.; bent, as in young shells, a little more towards the apex, and the curve greater on the convex slope, slightly carinated on each side. SCULPTURE. – Faint, but very regular, longitudinal striae, about 0.01 in. apart, apparently in the texture of the shell, which thus seems to be built up of minute, square-faced rods laid side by side. Crossing these at right angles are sharp, irregular scratches in the line of growth, nearly circular, but bent a little forwards on the concave curve. L. 0.45. B. at mouth 0.05 (least), 0.06 (greatest), apex 0.019.

It is very possible that this may be a *Siphonodentalium*, as M. Gwyn Jeffreys suggested; but in the absence of the animal and the rubbed condition of both ends of the shell it is impossible to say. It resembles *S. tetragonum* Brocchi more than any other, but the want of the angles, the different character of the longitudinal striae, and above all, the compression, separate it completely. There is only the one dead discoloured and somewhat rubbed specimen.

Type Depository: British Museum, Cat. No. 1877.2.9.35.

Type Locality: North of Culebra Island, West Indies, 18°38'30" N; 65°05'30" W, 714 m.

Geographic Range: Northern limit: *Gosnold* Sta. 1854, North Blake Plateau, 617 m. ^a Southern limit: *Chain* 50 Sta. 169 off Recife, Brasil, 08°03.0' to 08°02.0' S; 34°23' to 34°25' W, 587 m, MCZ, no Cat. No. ^a

Description of *Dentalium (Compressidens) pressum* Pilsbry & Sharp, 1897

Shell small, slightly and evenly curved, thin, considerably tapering, the tube strongly compressed between its convex and concave sides, almost subangular on the lateral sides. White, somewhat shining. Sculpture: faint, low, regular, longitudinal riblets with very shallow intervals, crossed at right angles by close, "sharp, irregular scratches in the line of growth," bent forward on the concave side of the

^a New record

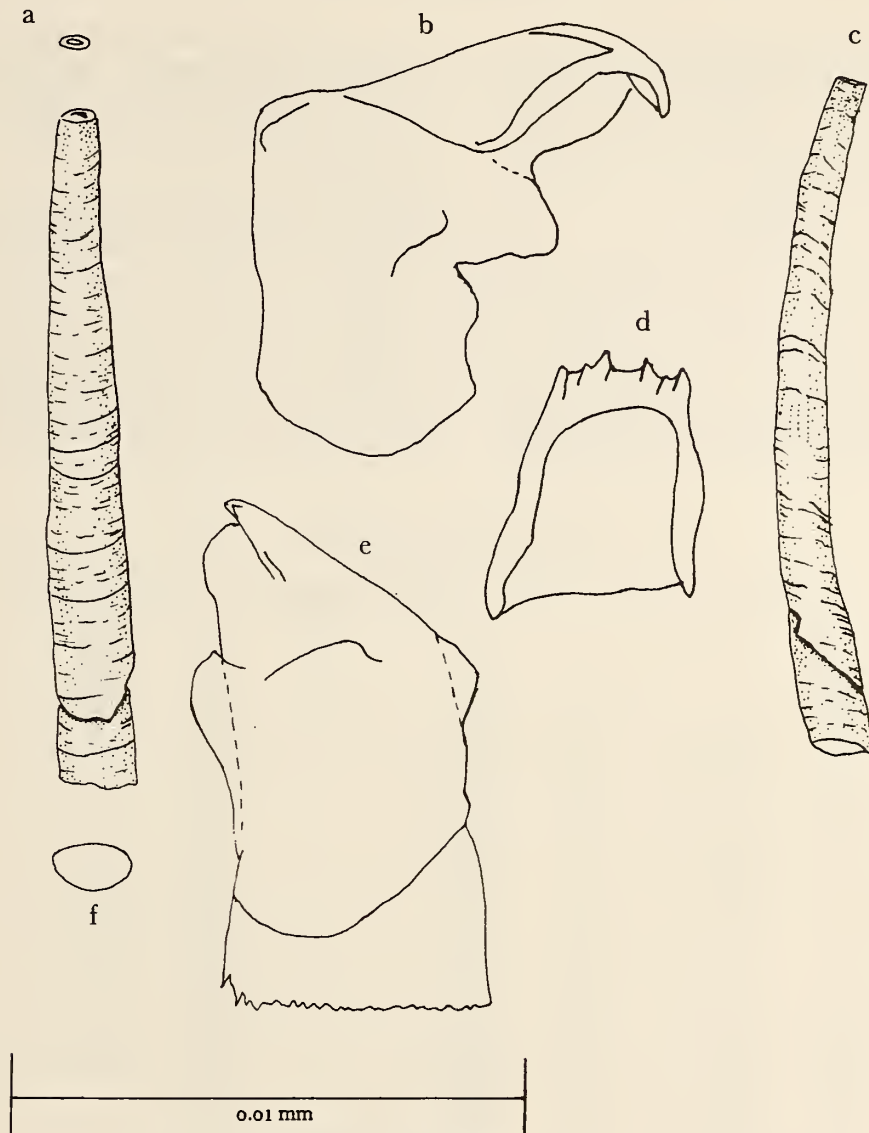


Figure 1

Shell and Radula of *Pulsellum pressum* (Pilsbry & Sharp, 1897)
 a - apex and shell; b, e - lateral teeth; c - shell, side view;
 d - median tooth; f - aperture; scale 0.01 mm (teeth only)
 Shell: AMNH Cat. No. 146285; length 1.77 mm; width (narrow)
 0.18 mm; aperture 0.10 mm

tube, which is also faintly wrinkled in the same direction toward the larger end. Aperture decidedly oblique, oval, the arc along the concave side generally less curved than the rest of the peristome. Apical orifice oval, without slit or notch.

Length 12, greatest diam. of aperture 2, least 1.75 mill., diam. at apex 0.75 mill. (S. & P. type).

Length 0.45, greatest diam. at aperture 0.06, least 0.05 inch., diam. at apex 0.019 inch = 11.25, 1.5, 1.25, 0.475 mill. (Watson's type).

Type Depository: British Museum, Cat. No. 1887.2.9.35.

Type Locality: Herein selected North of Culebra Island, West Indies, 18°38'30" N; 65°05'30" W; 714 m.

Remarks: I have not seen the type, but Mrs. K. M. Way at the British Museum (Natural History) has located the type lot. The type locality is set by Watson's selection of the type. PILSBRY & SHARP (1897) did not designate a type locality for *Dentalium pressum* and, to avoid confusion, it is herein selected (see above).

Radula: Median tooth is higher than wide while the lateral teeth are shortened and the cusps more prominent than the typical *Dentalium* types. Even without the altered laterals, the median radular tooth relegates this species to the Siphonodentaliidae. This taxon is the type of *Compressidens*, and as such, the subgenus must be moved also. EMERSON (1962) suggested such a possibility, and he also suggested the subgenus be placed in *Pulsellum*

s. l. All radular specimens were dried materials and until soft parts can be examined, EMERSON's (*op. cit.*) suggestion is accepted. The outstanding feature of *Compressidens*, dorso-ventral compression, separates it as a subgenus of *Pulsellum*.

Size: The largest individual is U. S. N. M. Cat. No. 314578 and measures L 20.0, W (lesser) 2.1, A 1.0, T 0.6. The shallowest recorded specimen is U. S. N. M. Cat. No. 108161 in 172 m and the deepest is *Gosnold* Sta. 1829 in 1431 m.

Materials Examined: All materials listed by HENDERSON (1920), except U. S. N. M. Cat. No. 323776, were examined. All other materials in the museums were examined and the following are supplemental materials from the faunal area.

MATERIALS EXAMINED

Catalog Numbers	Institution	Depth	Location		Number of Individuals
			North Latitude	West Longitude	
1854	NMFS	617 m	33°51.0'	75°59.4'	1
1853	NMFS	853 m	33°44.7'	75°57.3'	5
1835	NMFS	766 m	33°04.3'	76°27.1'	1
1834	NMFS	881 m	32°56.2'	76°23.1'	2
1828	NMFS	881 m	32°37.0'	76°41.8'	5
1829	NMFS	1431 m	32°31.9'	76°31.8'	7
1752	NMFS	499 m	31°28.7'	79°29.0'	2
1726	NMFS	494 m	29°32.8'	80°00.0'	4
1725	NMFS	460 m	29°20.4'	80°01.3'	5
1723	NMFS	494 m	29°10.4'	79°55.3'	22
1638	NMFS	406 m	28°40.5'	79°50.4'	6
1635	NMFS	348 m	28°30.8'	79°52.0'	1
1632	NMFS	479 m	28°06.6'	79°43.2'	6
1628	NMFS	529 m	27°49.8'	79°41.4'	1
1561	NMFS	261 m	25°39.7'	80°02.7'	4
146285	AMNH	348 m	off Fowey Light, Florida		1
no Cat. No.	USNM	348 m	Eolis Sta. 377 off Fowey Light, Florida		2
no Cat. No.	USNM	256 m	Eolis Sta. 379 off Fowey Light, Florida		1
1595	NMFS	500 m	24°54.8'	80°03.5'	2
72365	ANSP	787 m	33½ mi S Rebecca Shoals, Rush		1
148327	AMNH	620 m	24°08'	82°15'	1
186630	MCZ	1051 m	23°21'	80°23'	1
no Cat. No.	MCZ	1074 m	08°03.0' - 08°02.0' S 34°23' - 34°25' W		1

Pulsellum (Compressidens) ophiodon Dall, 1881

(Figures 2a to 2g)

Dentalium ophiodon Dall, 1881, Bull. Mus. Comp. Zool. 9: 38. - DALL, 1889, Bull. Mus. Comp. Zool. 18: 427; pl. 26, fig. 9. - DALL, 1889, Bull. U. S. Nat. Mus. 37: 76; pl. 26, fig. 9, and reprint 1903.

Dentalium (Compressidens) ophiodon, Pilsbry & Sharp, 1897, in TRYON, Man. Conch. 17: 126; pl. 7, fig. 13; pl. 22, figs. 61, 62. - HENDERSON, 1920, Bull. U. S. Nat. Mus. 111: 84; pl. 14, fig. 2. - EMERSON, 1952, Smithsonian Misc. Coll. 117 (6): 7. - TURNER, 1955, Deep Sea Res. 3 (Suppl.): 319, paratype in MCZ.

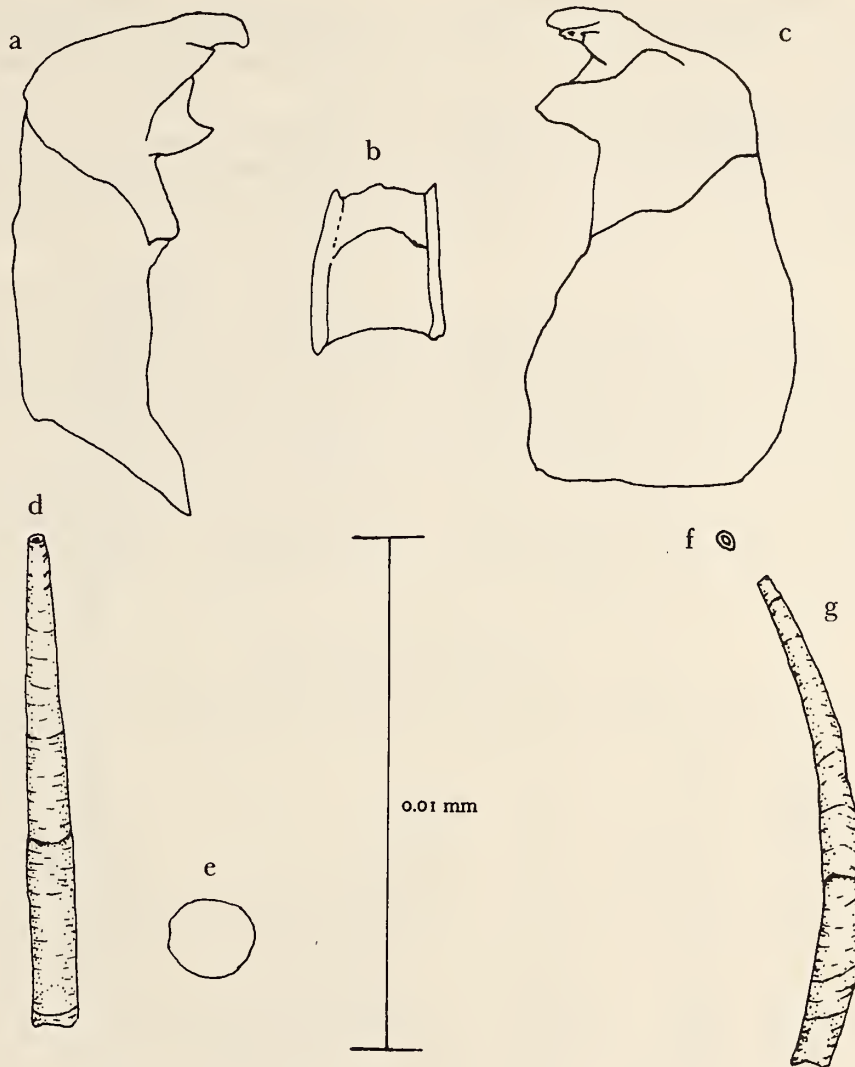


Figure 2

Shell and Radula of *Pulsellum ophiodon* (Dall, 1881)

a, c - lateral teeth; b - median tooth; d - shell; e - aperture;
f - apex; g - shell, side view; scale 0.01 mm (teeth only)
Shell: AMNH Cat. No. 148328; length 1.28 mm; width (narrow)
0.12 mm; aperture 0.13 mm

Original Description: About the same length as the last species [*Dentalium compressum*], more slender, more acute, more translucent, more curved, and without the evanescent indications of longitudinal striation; the compression results in less tendency to angulation, and there is an evident tendency, in adult specimens, for the diameter at the mouth to be somewhat less than at a short distance behind it, - a very marked

distinction as between the two. The shell is quite translucent, and very thin; there is very little variation between the specimens. Lon. 12.5. Anal diam. 0.27. Major oral diam. 1.3. Minor do. 1.1 mm.

Station 19, 310 fms.; Station 20, 220 fms.; Station 21, 287 fms.

The flattening is most prominent a little way behind the mouth in the adult, and is best seen in an adolescent specimen.

Type Depository: Lectotype, U. S. N. M. Cat. No. 95344.

Type Locality: Herein selected, *Blake* Sta. 20 off Bahia Honda, Cuba, 402 m.

Geographic Range: Northern limit: Off Fernandina, Florida, 30°58'30" N; 79°38'30" W; 531 m; U. S. N. M. Cat. No. 314834. Southern limit: Off Lazaretto, Barbados, 238 - 256 m; U. S. N. M. Cat. No. 314835. I have not seen this specimen.

Remarks: DALL (1881) relied on comparing this species with *Pulsellum (Compressidens) pressum* for his description and thus relegated *P. (C.) ophiodon* to the Dentaliidae, but median radular tooth morphology makes this untenable. HENDERSON (1920) selected U. S. N. M. Cat. No. 95344 as the type and TURNER (1955) followed this designation. The type locality is herein selected as indicated above.

There is no reason to separate this species from *Compressidens* at present, but it could as easily be placed in

Cadulus (Gadila) with *Cadulus acus* Dall and *C. dominiguensis* d'Orbigny. The latter species is suggestive of, but may belong to a shallower province than, *Pulsellum ophiodon*.

Radula: The median tooth is higher than wide, and it and the lateral teeth are nearly identical with those of *Pulsellum pressum*. The largest individual is L 15.5, W (lesser) 1.5 (PILSBRY & SHARP, 1897). I have not seen this specimen.

This is an outer continental shelf/upper continental slope species. The shallowest recorded specimens are from 128 to 165 m off Fowey Light, U. S. N. M. Cat. No. 314583, and the deepest are from 439 to 549 m (EMERSON, 1952). Specimens from shallow waters assigned to this species are probably *Cadulus acus*.

Materials Examined: I have seen all materials listed by HENDERSON (1920) except U. S. N. M. Cat. No. 314835. The following are additional records from the Western North Atlantic.

MATERIALS EXAMINED

Catalog Numbers	Institution	Depth	Location		Number of Individuals
			North Latitude	West Longitude	
1728	NMFS	533 m	29°49.3'	79°57.8'	1
129436-A	AMNH		Biscayne Bay, Florida, June 1947 (sp.?)		3
148328	AMNH	128- 165 m	<i>Eolis</i> Sta. 373 off Fowey Light, Florida		1
312615	ANSP	183 m	Alligator Reef Light, Lower Florida Keys, J. Moore, 1965		40+
306338	ANSP	366- 421 m	S. W. Egmont Key, D. Steger, May 1962		60+
no Cat. No.	MCZ	218 m	80 mi S. W. Cape San Blas, Florida		1
134108	AMNH	1097-1280 m	off Fresh Creek, Andros, Bahamas		1
72366	ANSP	366 m	Campeche-Yucatan (Rush)		1
7727	MCZ	567 m	<i>Blake</i> Sta. 19 off Bahia Honda, Cuba		1
7728	MCZ	402 m	<i>Blake</i> Sta. 20 off Bahia Honda, Cuba		1
7729	MCZ	525 m	<i>Blake</i> Sta. 21 off Bahia Honda, Cuba		1
191272	MCZ	457 m	23°11'	81°55'	1

Pulsellum (Compressidens) wellsiana Kraeuter, spec. nov.
(Figures 3a to 3f)

DIAGNOSIS – Shell: Thick except at apex and aperture; delicate appearance; aperture strongly dorsoventrally compressed; ovate in cross section except for smallest tip; no keels; arc slight, greatest in posterior quarter; diameter increases rapidly, then tapers to anterior; convex side expands more rapidly than concave. Greatest diameter behind aperture. **Apex:** with slight indications of notches on convex and concave sides of young; older shells

laterally excavated. **Color:** white or grayish white; translucent to semitransparent or mottled; rib surface sometimes glassy. **Sculpture:** consists of 11 primary ribs intercalated by one rib in each interspace, intercalations completed within one-third of shell length from apex; intercalated ribs expand and equal primary ribs; second intercalation of one rib in each intercostal space by three-fourths shell length from apex; secondary intercalating ribs never equal primary ribs or primary intercalating ribs. Primary ribs initially narrower than intercostal spaces; interspaces concave, gradually merging into ribs. After

secondary intercalation primary ribs and primary intercalating ribs nearly equal intercostae; all ribs reach aperture. Transverse sculpture confined to fine growth lines, clearest immediately posterior to aperture.

Radula: With 17 tooth rows; median tooth higher than wide; slightly bidentate from corners, medially serrated

(?); lateral teeth short, three major denticles; somewhat similar to others in subgenus.

Measurements of Holotype: L 6.2, W (narrow) 0.7, W (wide) 0.9, A 0.3, T 0.2. **Largest individual:** L 6.6, W (narrow) 0.7, W (wide) 0.9, A 0.4, T 0.2.

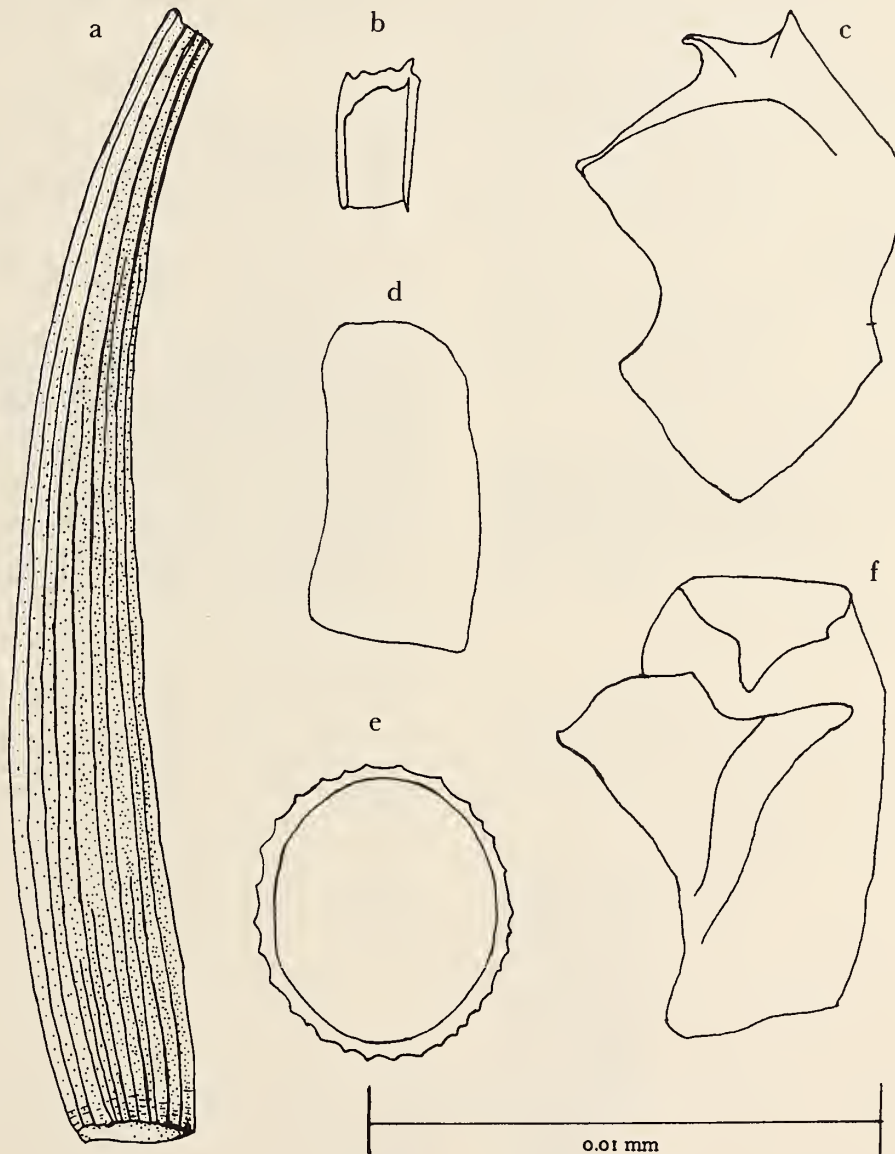


Figure 3

Shell and Radula of *Pulsellum wellsiana* Kraeuter, spec. nov.
a - shell; b - median tooth; c, f - lateral teeth;

d - marginal tooth; e - aperture; scale 0.01 mm (teeth only)
Shell: Holotype: length 6.2 mm; width 0.7 mm; aperture 0.3 mm

Type Depository: Holotype ANSP Cat. No. 320993. Paratypes ANSP Cat. No. 300672, 5 individuals; only known specimens.

Type Locality: Sta. 14 James Tyler, 31 to 38 m, outer slope of beach, 1 mile W Georgetown, Grand Cayman Island, October 1964.

Remarks: This is the first siphonodentaliid, other than *Entalina*, known to possess definite ribs. *Pulsellum wellsi-ana* is included in *Compressidens* primarily because of the dorsoventral compression of the shell. It is similar to *P. ophiodon* in general shape, but is much smaller and has definite ribs. It differs from other *Pulsellum* and resembles *Cadulus* by having the greatest diameter behind the aperture. Until a revision of the Siphonodentaliidae is attempted, it seems best to modify *Pulsellum* and keep the compressed forms together.

The species is named in honor of Dr. and Mrs. Harry W. Wells.

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Dr. R. Turner (MCZ) and Dr. H. Sanders (WHOI) have kindly given permission to publish the southern records from the MCZ collections. All materials listed as NMFS were lent to the author by Dr. R. Wigley, NMFS, Woods Hole, Massachusetts, and his generosity is greatly

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